

3 of interleaved converter circuits operating into a common
4 load, comprising:

5 a plurality of pulse width modulators each controlling
6 power switching devices of one of the plurality of
7 interleaved converter circuits;

8 a feedback circuit responsive to a voltage across the
9 common load;

10 control circuits for controlling the plurality of pulse
11 width modulators responsive to the feedback circuit and a
12 commanded output voltage, and for adjusting a nominal duty
13 cycle of the plurality of interleaved converter circuits;

14 the plurality of pulse width modulators and the control
15 circuits being in a single integrated circuit.

1 23. The DC to DC switching circuit of claim 22 further
2 comprising a current sense circuit for balancing current in
3 the plurality of interleaved converter circuits.

1 24. The DC to DC switching circuit of claim 22 further
2 comprised of an integrator having an output responsive to
3 the integral of an error signal, the error signal being
4 responsive to the voltage across the common load and a
5 desired voltage, the control circuits also being responsive
6 to the output of integrator.

1 25. The DC to DC switching circuit of claim 24 wherein
2 a time constant of the integrator is adjustable by the

3 selection of at least one component external to the
4 integrated circuit.

1 26. The DC to DC switching circuit of claim 24 further
2 comprised of a differentiator having an output responsive to
3 the rate of change of the voltage across the common load,
4 the control circuits also being responsive to the output of
5 differentiator.

1 27. The DC to DC switching circuit of claim 26 wherein
2 the time constant of the differentiator is adjustable by the
3 selection of at least one component external to the
4 integrated circuit.

1 28. The DC to DC switching circuit of claim 22 wherein
2 the control circuits are also responsive to rapid decreases
3 in the voltage across the common load to turn on the
4 plurality of converter circuits independent of the phase of
5 the plurality of pulse width modulators.

1 29. The DC to DC switching circuit of claim 28 wherein
2 the control circuits are also responsive to rapid increases
3 in the voltage across the common load to turn off the
4 plurality of converter circuits independent of the phase of
5 the plurality of pulse width modulators.

1 30. The DC to DC switching circuit of claim 22,
2 wherein the plurality of pulse width modulators consist of a
3 pair of pulse width modulators.

1 31. The DC to DC switching circuit of claim 22 wherein
2 the feedback circuit is in the single integrated circuit.

1 32. A DC to DC switching circuit for controlling power
2 switching devices in a DC to DC converter having a plurality
3 of interleaved converter circuits operating into a common
4 load, comprising:

5 a plurality of pulse width modulators each controlling
6 power switching devices of one of the plurality of
7 interleaved converter circuits;

8 a feedback circuit responsive to a voltage across the
9 common load;

10 control circuits being responsive to the feedback
11 circuit and a commanded output voltage to control a nominal
12 duty cycle of the plurality of converter circuits, the
13 control circuits also adjusting a relative duty of the
14 plurality of converter circuits;

15 the plurality of pulse width modulators and the control
16 circuits being in a single integrated circuit.

1 33. The DC to DC switching circuit of claim 32 further
2 comprising:

3 current sense circuits, the control circuits being
4 responsive to the current sense circuits to tend to minimize
5 a difference of current between the plurality of interleaved
6 converter circuits.

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1 34. The DC to DC switching circuit of claim 33 wherein
2 the control circuits control the plurality of pulse width
3 modulators.

1 35. The DC to DC switching circuit of claim 32 further
2 comprising: an integrator having an output responsive to
3 the integral of an error signal, the error signal being
4 responsive to the voltage across the common load and a
5 desired voltage.

1 36. The DC to DC switching circuit of claim 35,
2 wherein the control circuits is also responsive to the
3 output of integrator.

1 37. The DC to DC switching circuit of claim 35 wherein
2 a time constant of the integrator is adjustable by the
3 selection of at least one component external to the
4 integrated circuit.

1 38. The DC to DC switching circuit of claim 35 further
2 comprising a differentiator having an output responsive to a
3 rate of change of the voltage across the common load, the

4 control circuits also being responsive to the output of
5 differentiator.

1 39. The DC to DC switching circuit of claim 38 wherein
2 a time constant of the differentiator is adjustable by the
3 selection of at least one component external to the
4 integrated circuit.

1 40. The DC to DC switching circuit of claim 32 wherein
2 the control circuits are also responsive to rapid decreases
3 in the voltage across the common load to turn on the
4 plurality of converter circuits, independent of the phase of
5 the plurality of pulse width modulators.

1 41. The DC to DC switching circuit of claim 32 wherein
2 the control circuits are also responsive to rapid increases
3 in the voltage across the common load to turn off the
4 plurality of converter circuits, independent of the phase of
5 the plurality of pulse width modulators.

1 42. The DC to DC switching circuit of claim 32,
2 wherein the plurality of pulse width modulators consist of a
3 pair of pulse width modulators.

1 43. The DC to DC switching circuit of claim 32 wherein
2 the commanded output voltage is controllable through an
3 input to the integrated circuit.

1 44. The DC to DC switching circuit of claim 32 wherein
2 the feedback circuit is in the single integrated circuit.

1 45. A circuit in a DC to DC converter having a
2 plurality of interleaved converter circuits operating into a
3 common load, comprising:

4 a plurality of pulse width modulators each controlling
5 power switching devices of one of the plurality of
6 interleaved converter circuits;

7 control circuits for adjusting a nominal duty cycle of
8 the plurality of interleaved converter circuits;

9 the plurality of pulse width modulators and the control
10 circuits being in a single integrated circuit.

11 46. A DC to DC switching circuit for controlling power
12 switching devices in a DC to DC converter having first and second
13 interleaved converter circuits operating into a common load,
14 comprising:

15 a first pulse width modulator controlling the power
16 switching devices of the first converter circuit;

17 a second pulse width modulator controlling the power
18 switching devices of the second converter circuit;

19 a feedback circuit responsive to the voltage across the
20 common load;

21 control circuits for controlling the first and second pulse
22 width modulators responsive to the feedback circuit;

